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Case No: CH/2004/APP/0255

Neutral Citation Number: [2004] EWHC 2107 (Pat)
IN THE HIGH COURT OF JUSTICE
CHANCERY DIVISION
PATENTS COURT
(ON APPEAL FROM THE COMPTROLLER-GENERAL
OF PATENTS, TRADE MARKS AND DESIGNS)

Royal Courts of Justice
Strand, London. WC2A 2LL
Date: Wednesday, 28 July 2004

Before:
THE HONOURABLE MR. JUSTICE LADDIE

BETWEEN:

(1) I.D.A. LIMITED
(2) COLIN THOMAS METCALFE
(3) DAVID JULIAN LAX
(4) POLYMER POWDER TECHNOLOGY
(LICENSING) LIMITED

Claimants (Referrers)/
Respondents

-and-

(1) THE UNIVERSITY OF SOUTHAMPTON
(2) PHILIP EDWIN HOWSE
(3) ROGER EDWARD ASHBY

Defendants (Respondents)/
Appellants

Mr D. Alexander Q.C. and Mr. T. Moody-Stuart (instructed by Messrs. G. A. Richards
(University of Southampton) appeared on behalf of the Claimants.
Mr. J. St. Ville (instructed by Messrs. Dewar Hogan) appeared on behalf of the Defendants.

APPROVED JUDGMENT

(Based on the tape transcription by
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Mr Justice Laddie:

1. Emerson is said, probably inaccurately, to have coined the saying: "Build a better mousetrap and the world will beat a path to your door." This case suggests that if you build a better insect trap, you should beat a path to your lawyer's door.
2. This appeal concerns a dispute between IDA Limited ("IDA"), Mr. Colin Thomas Metcalfe, Dr. David Julian Lax and Polymer Powder Technology Licensing Limited ("PPT"), the claimants, and the University of Southampton, Professor Philip Edwin Howse, OBE, and Dr. Roger Edward Ashby, the defendants, over ownership of a bundle of patent applications relating to methods and devices for catching and killing insects such as cockroaches and house flies. They include patent application no.GB9814507.1 dated 3 July 1998, international application no.PCT/GB99/02090, European patent application no.99929525.6 and Australian patent application no.4631799.
3. The applications were filed by or on behalf of the University. Professor Howse and Dr. Ashby were named as inventors. A major feature in the patent applications was the use of fine magnetic powder, either alone or as a carrier for other substances such as insecticides. The defendants had co-operated with the claimants and believed that they have played a crucial role in the origination and development of the subject matter of the patent applications. They believed that they were either the sole, or joint, inventors, had a contractual right to share the benefit of the research work leading to the applications and that the latter were based upon the use of their confidential information. The defendants took the view that the claimants had no interest whatsoever in the inventions. Negotiations between the parties to resolve these differences broke down and, in late, 2001, the claimants made reference to the patent office to determine questions of inventorship and entitlement under ss.8, 12 and 13 of the Patents Act 1977 ("the Act").
4. In that reference, they sought, amongst other things, declarations that:
 - "2. ...
 135. the First Referrer [that is IDA] is entitled to be the sole proprietor of each of the said patent applications and any patent, petty patent, design patent or other similar forms of protection throughout the world (within the meaning of s.12(7)(a) of the Patents Act 1977) derived or claiming priority therefrom or, alternatively, to be joint proprietor thereof with the First Applicant [that is the University of Southampton];
 - (2) the First Referrer has the right to be granted European Patent Application No.99929525.6 and any patent deriving or claiming priority therefrom or, alternatively, jointly entitled to be granted to them with the First Applicant;
 - (3) the Second Referrer [that is Mr. Metcalfe] and the Third Referrer [that is Dr. Lax] and only they are the true inventors of the Patent Applications;

(4) in the alternative, such part (if any) of the said patent applications and each patent, petty patent, design patent or other similar forms of protection (within the meaning of s.12(7)(a) of the Patents Act 1977) derived or claiming priority therefrom, as the First Applicant may be entitled to, is held by the First Applicant on trust for the First Referrer by reason of the Applicant's breach of confidence and misuses of confidential information.

135. That the First Referrer is to be entitled to be the sole proprietor of each of the Patent Applications and any patent (within the meaning of s.12(7)(a) of the Patents Act 1977) deriving or claiming priority therefrom or, alternatively, to be joint proprietor thereof with the First Applicant;

135. That the First Referrer has a right to be granted European Patent Application Publication No.99929525.6) and any patent deriving or claiming priority therefrom or, alternatively, jointly entitled to be granted them with the First Applicant;

135. European Patent (Application No.99929525.6) shall proceed in the name of the First Referrer or, alternatively, in the joint names of the First Referrer and the First Applicant."

5. The matter came on for hearing before the Divisional Director acting for the Comptroller in March 2003. There was a hearing which lasted some six days. Five days of that was taken up with cross-examination, including extensive cross-examination of Professor Howse and Mr. Metcalfe, the main actors in this dispute. There was a transcript of the hearing. The Divisional Director did not give his decision until a year later.

6. It is not necessary to repeat here what the Court of Appeal said at para.113 of its judgment in *Goose v. Wilson Sandford & Co.* [1998] EWCA SIV 245 as to why long delays between a trial and judgment is unfair to parties and has the potentiality to undermine confidence in both the correctness of the judgment and the legal system itself.

7. In that case, the criticism was directed at a judgment given by a High Court judge. However, the principles must apply to all courts and tribunals which issue judgments or decisions. In the High Court and the Court of Appeal great care is now taken to ensure that all judgments are given as quickly as possible. In practice, this means that, save in exceptional cases, they are given within three months of the hearing and frequently much sooner than that. The same approach should be adopted by those acting on behalf of the Comptroller. There is, in my view, nothing in this case which renders it exceptional. There is nothing particularly complicated about the facts, the technology or the applicable law.

8. Neither side has suggested that the delay has caused any particular hardship, nor is it suggested that the Divisional Director's decision is to be given less weight or can be challenged on this basis. On the contrary, it is clear that the decision is one which has

been prepared with great care and thoroughness. Neither Mr. Daniel Alexander Q.C., who appears for the defendants, nor Mr. James St. Ville, who appears for the claimants, suggest otherwise. Nevertheless, a delay of a year in giving a decision is unacceptable. The fact that in other Patent Offices, including in the European Patent Office, long delays between hearings and the publication of decisions are not unheard of is irrelevant. The United Kingdom Patent Office and those acting on behalf of the Comptroller should be subject to the same self discipline as applies to the High Court and the Court of Appeal.

9. The Divisional Director held that there was no binding contract to share the results of the joint research work on which the claimants could rely. On the other hand, he held that Professor Howse and Dr. Ashby were not the inventors of the invention or inventions in the patent applications but that Mr. Metcalfe and Dr. Lax were. He held that, on many crucial issues, Professor Howse's and Dr. Ashby's evidence could not be relied upon. The result was that he decided that the applications were to be transferred to the claimants, the defendants having no interest in them. From that decision, the defendants appeal.

10. In their grounds of appeal, the defendants state:

"28. In all the circumstances, the Divisional Director should have held that Mr. Metcalfe was not the inventor of the inventive concepts in question; alternatively that if Mr. Metcalfe can properly be said to have invented anything, as opposed to making an untested suggestion, his entitlement and the consequential entitlement of IDA was limited to that of joint inventorship of a much narrower concept than that identified by the Divisional Director."

11. Before me, the defendants restrict themselves to seeking a finding of joint inventorship only.

12. To understand the points which arise before me, it is necessary to understand at least some of the background which led to the invention or inventions in suit. Professor Howse is a well known entomologist. At the time of conception of the inventive ideas in issue here, he was based at the University of Southampton. He had developed a particular skill and expertise in killing insects. In 1992, well before the events the subject of this dispute, he was named as inventor of patent EP0650322. This bears the title "Pest Control". The specification describes how electrostatically-charged particles can be used to kill insects. Two general methods of doing this are described. For example, the specification includes the following two consistory clauses:

"19. Accordingly, in one aspect, the present invention provides a method of controlling pests, such as insects, by killing them, wherein at least part of a pest to be killed is exposed to particles coated on surface to which the pest is lured, the particles carrying an electrostatic charge which is of opposite polarity than that of the surface of the pest and having a pesticide or behaviour-modifying chemical associated therewith.

20. In another aspect, the present invention provides a method of controlling pests, such as insects, by trapping them, wherein at least part of a pest to be trapped is exposed to particles coated on a surface to which the pest is lured, the particles carrying an electrostatic charge which is of opposite polarity to that of the surface of the pest, whereby a pest which lands on the surface becomes at least partially coated with the charged particles so that it loses its ability to adhere to the surface and falls into a trapping zone."

13. Although these method both use charged particles, they are different in the way they work. The specification describes how insects adhere to smooth or inclined surfaces by the use of adhesive organs on their feet. The latter are covered by fine hairs on to which the insect secretes an oily substance. It is these oily hairs which allow the insect's feet to grip surfaces. The specification explains how this adhesion can be significantly reduced by the use of charged particles. It say ::

"27. It is observed that, as the feet of an insect become covered in particles, the insect loses its ability to adhere to a smooth and, particularly, an inclined surface. Particles also interfere with the insect's sense organs, which may cause the insect to groom more frequently. In the case of flying insects, it is known that the flight reflex is inhibited by contact of the feet with any substrate. Accumulation of particles on the insect's feet tend to inhibit both the flight and adhesion of the insect, which is thus more likely to fall from an inclined surface. A flying insect having landed on a suitably coated and inclined surface is thus unlikely to fly away and simply slides down the surface."

14. The specification describes a method for using this effect. It says:

"30. In the method of the invention, the particles which carry an electrostatic charge of opposite polarity to that of the surface of an insect to be trapped and/or killed are attracted to the insect by electrostatic forces and adhere to the insect's cuticle. Particles also adhere to the insect's feet, which causes an insect to become de-stabilised and to lose its grip on a surface on which it stands. The insect may then fall into a trapping zone which may include a fluid, a powder, a desiccant, a chemical toxicant or an adhesively sticky or tacky surface or any combination thereof for retaining the insect therein."

15. The specification illustrates a number of mechanical devices with inclined or vertical surfaces or ledges which can utilise charged particles to trap insects. The specification also includes the following passage:

"59. A modification for the embodiments of trap described above in relation to drawings, involves the emission of at least the trapping zones 13 and 19, 24 and 25, 41 and 43, 67 so that flying or crawling insects contaminated with the particles, including an insecticide or other chemical, will return to contaminate other insects with the insecticide. This is applicable especially, but not exclusively, to so-called social insects such as bees, wasps, ants and termites."

16. What is apparent is that, as paras.19 and 20 of the specification indicate, this patent covers two rather different inventions or applications of the same invention. The first, which takes up the bulk of the specification, consists of a method and apparatus for immobilising an insect by interfering with the ability of its feet to adhere to a surface. The other is different. Here the electrostatic powder mixed with a chemical such as an insecticide is attached to the outer surface (that is the cuticle) of the insect and, instead of being immobilised, it flies to meet other insects, thereby passing the chemical on to others. The common feature of the two ideas is the use of the electrostatically-charged particles.
17. Professor Howse's invention caused something of a stir. It was decided to select 200 inventions which demonstrated British flair for presentation by the Prime Minister, Mr. Blair, as part or, or as a precursor to, the millennium celebrations. Professor Howse's electrostatic insect trap was one of those selected. This was picked up by *The Times* newspaper, which, on 2 April 1998, published an article under the title "Unveiled: cockroach trap to beat the world". The article includes a photograph of the Professor looking under the lid of one of his cockroach traps. The article includes the following:

"Among the more interesting items is the Eco Biotic Cockroach Trap, created by scientists at Southampton University. They tested it in a London flat, where it terminated 50,000 roaches."
18. I understand this to be something of an exaggeration. Even the more commodious flats in London do not normally house 50,000 cockroaches. I do not know what the position is in Southampton.
19. The article continues by describing how the trap works, as follows:

"The creatures are lured on to the bridge of the wooden box by a bait. When their feet alight on the electrostatic talcum powder with which it is dusted, they slip on to a flypaper and meet their end. The absence of pesticides is cited as an advantage over more traditional forms of extermination, and a \$1million deal has been clinched with an American manufacturer."
20. This is an adequate aragr of one of the inventions or embodiments in Professor Howse's patent, namely the one involving interference with adhesion of the insect's feet. There is no allusion in the article to the Professor's other invention or embodiment. The reference to the avoidance of insecticides would make any such allusion inappropriate.
21. There is no dispute that Mr. Metcalfe read this article on or about the date of its publication. Mr. Metcalfe is a consultant in the field of magnetic powders, industrial-waste powders and various ferrosilicates for IDA. Neither he nor anyone else on the claimants' side is an entomologist.

22. On 24 April, Mr. Metcalfe telephoned Professor Howse. His evidence was to the effect that he suggested to the Professor that magnetic powder might prove a worthwhile substitute for the electrostatic powder described in *The Times* article. Professor Howse gave a very different account of events. Although he accepts that the use of magnetic powders was discussed in the telephone conversation, the Professor had said he had already had this idea in 1992 and, over the ensuing six years, had intermittently been looking for a suitable source of magnetic powders.
23. This part of the Professor's evidence was one of those which the Divisional Director did not accept. In any event, there were further contacts between Professor Howse and Dr. Ashby on the one side and Mr. Metcalfe and Dr. Lax on the other. Dr. Ashby was, at the relevant time, managing director of Southampton Innovations Limited, a company used by the University to commercialise its inventions. Dr. Lax was leader of the research group at Teeside University, as well as a consultant to IDA at the relevant time. The various meetings were held under a regime of confidence. Mr. Metcalfe supplied samples of different magnetic powders to Professor Howse for testing.
24. On 13 May 1998, Professor Howse telephoned his patent agent to advise her that he had a new invention relating to the use of magnetic materials in pest control. On 22 May, he faxed her a first draft of a patent application on the use of magnetic particles which adhere to the cuticles of arthropods. Further information was sought from, and suggested by, the Professor. Throughout this time, the Professor was in discussion with various of the claimants and discussing a draft co-operation agreement with them. The first application for a patent on pest control using magnetic powders was filed on 3 July 1998. The Professor did not inform any of the claimants about his discussions with his patent agent, his drafting of a patent application or its filing; they only found out about it subsequently. They claim that Mr. Metcalfe and Dr. Lax were the inventors and that they were entitled, at the least, to a share in the patents. As mentioned above, attempts to resolve their claims by negotiation failed; hence this litigation.

The United Kingdom Application

25. Much of the language in the United Kingdom application in suit is similar to that in Professor Howse's 1992 patent. The same prior art is described. However, there is now included a reference to the Professor's own prior work with electrostatic powders. As the Divisional Director said:

"31. The United Kingdom application opens with a statement that the invention relates to a method and apparatus for controlling pests by trapping or killing them and that the invention particularly concerns the control of flying or crawling insect. Houseflies, mosquitos and cockroaches are identified as the most common domestic insect pests. By way of background the application states that the prolonged use of insecticides can lead to insecticidal resistant insects and goes on to refer to public pressure throughout Europe for the development of environmentally acceptable pest control measures. This leads in to an acknowledgment of an earlier international patent application (WO

94/00980) by the University and some disadvantages associated with the invention of this earlier application. The stated disadvantages are that electrostatically charged particles used in the earlier invention must be charged before use, they also lose their charge rapidly in conditions of high humidity and when moisture films develop and they are prone to loss due to wind, currents or shaking.

135. The invention is introduced in the application by the following statement:

'We have now developed a method and apparatus for controlling pests which involves the use of particles which are permanently magnetised and are not affected by moisture or humidity and which, when anchored or (*sic*) a conducting or magnetic surface, will remain in position for long periods of time without losing their effectiveness. Although electrostatic-charged particles adhere to the cuticles of insects, it is surprising that ferromagnetic particles also adhere to the cuticles of insects and this is a surprising and unexpected effect.'

The specification then goes on to define the invention, as follows:

'Accordingly, the present invention provides a method' of controlling pests, such as insects, by trapping and/or killing them, wherein at least a part of the pest to be trapped or killed is exposed to a composition comprising particles containing or consisting of at least one magnetic material.'

135. Further aspects of the invention are defined in the specification, as follows:

'... a first pesticidal composition in particulate form which comprises composite particles each comprising a core of an inert substrate having a pesticide or behaviour modifying chemical impregnated thereon or associated therewith and the core being impregnated or coated with a ferromagnetic oxide.'

'... a second pesticidal composition in particulate form which comprises particles containing or consisting of a magnetic material in admixture with particles which contain or consist of one or more pesticides or behaviour-modifying chemicals.'; and

'... an insect trap which comprises a housing, a zone of the housing or a zone within the housing comprising a magnetically polarized material and the said zone being coated with a composition comprising particles containing or consisting of a magnetic material of opposite polarity to that of the magnetically polarised material.'

26. The Divisional Director accurately summarised the contents of the specification. His summary includes the following:

"35. As described in the application the magnetic particles may consist solely of magnetic material or they may be composite particles comprising a core of a chemically and biologically inert substrate, which is impregnated with and/or

coated with magnetic material. Additionally, the inert substrate may be impregnated with a pesticide or behaviour modifying chemical or the pesticide or behaviour modifying chemical may be absorbed on the substrate. The amount of pesticide or behaviour modifying chemical is stated to depend upon the intended release rate and duration but it generally comprises at least 0.1% by weight of the substrate. Such composite particles are alleged to have a dual effect: the magnetic material is stated to affect the orientation and stability of the insects while the pesticide or behaviour modifying chemical is stated to produce a second effect dependent on the particular nature of the pesticide or the behaviour modifying chemical. The pesticide used may be specifically targeted for particular pests. The application suggests the use of pesticides with a narrow spectrum of action, such as entomopathogens. The behaviour modifying chemical may be an attractant, such as a sexual pheromone. By way of example, it is suggested that an insecticide is applied to sexually mature male insects so that it spreads to the rest of the population during mating and swarming. Another embodiment of the invention comprises particles containing or consisting of magnetic material admixed with particles containing or consisting of one or more pesticides or behaviour modifying chemicals.

135. The application states that generally the particles are applied to a surface in an area where the pests are present. It goes on to explain how insects adhere to smooth or inclined surfaces. On their feet they have pads which are covered with numerous fine hairs with flattened tips. An oily substance is secreted on to the tips of the hairs so that surface molecular forces ensure adhesion of the hairs and hence the insects to a surface. This ability to adhere to surfaces is lost when an insect's feet become covered in particles. Moreover, the flight reflex of flying insects is said to be inhibited when their feet are in contact with any substrate, and so an accumulation of particles on their feet tends to inhibit not only the adhesion of an insect but also its flight. This makes it more likely that insects will fall from an inclined surface when their feet are contaminated by magnetic particles. In addition the application mentions that the magnetic particles might cause insects to groom more frequently by interfering with their sense organs.

135. The application envisages that the zone of magnetically polarized material, which is coated with the magnetic particles in the insect trap of the invention, may be a portion of one or more walls of the housing or a separate insert within the housing. It may be formed from a plastic material impregnated with a ferromagnetic oxide. In a preferred embodiment, this zone has an inclined surface which is inclined to the horizontal so as to assist the disorientation of insects crawling over it. As described there may also be a trapping zone into which the insects fall and come into contact with a fluid, a powder, a desiccant, a chemical toxicant or a sticky surface. Immobilised and trapped insects are left to die or are removed for destruction or study. Additionally, the trap may include a means to lure the insects, such as a light source or chemical stimulant."

27. The application includes a specific embodiment of trap designed to use the magnetic powders. It is similar in many respects to Professor Howse's original electrostatic trap. It functions in the same way, by interfering with the ability of the

insect's feet to adhere to surfaces. The application also contains the results of various experiments designed to determine how much magnetic powder attaches to the cuticle, not just the feet, of insects. I have set out claim 1 above. Other relevant claims include the following:

6. 21. "4. A method as claimed in any one of the preceding claims wherein the particles are applied to a surface in an area in which pests are present, preferably a surface which is inclined to the horizontal.

135. A method as claimed in any one of the preceding claims wherein the particles are composite particles which comprise a core of an insert substrate which is impregnated with and/or coated with, a magnetic material.

135. An insect trap which comprises a housing, a zone of the housing or a zone within the housing comprising a magnetically polarised material and the said zone being coated with a composition comprising particles containing or consisting of a magnetic material of opposite polarity to that of the magnetically polarised material."

28. As I have indicated above, the defendants' case was simple. Professor Howse and Dr. Ashby were solely responsible for the invention contained within the applications. Since it was clear that neither of them knew anything about, for example, coating or impregnating magnetic powder or the detailed composition of such powders or their particle size distribution, all of which must have come from Mr. Metcalfe and Dr. Lax, it is perhaps not surprising that the defendants argued before the Divisional Director that there was only one global inventive concept in the patents and applications, namely that of adhering particles by magnetic interaction to the cuticle of insects. This single inventive concept was, so the defendants argued, entirely the brainchild of Professor Howse and Dr. Ashby. It followed that they were the inventors of the totality of what is inventive in the patent applications. It was not the claimants, in whole or in part.

29. By contrast, the claimants, represented below and here by Mr. St. Ville, were more cautious; not only did they claim that Mr. Metcalfe and Dr. Lax were the inventors or entitled to a share in the patent applications but they also argued there were a number of inventive concepts in the patents and applications. The Divisional Director referred them as follows:

"(1) A method of apparatus to trap and kill and pests which involve use of particles which are permanently magnetised (and therefore are not affected by moisture or humidity) which, when anchored on a magnetic surface, remain in position for long periods of time without losing their effectiveness and the surprising effect arising from applying that method, that ferromagnetic particles adhere to the cuticles of insects which are exposed to them (the "Magnetic Powder" concept);

135. The insect trap comprising a housing, a magnetically polarised zone (made for example from a plastic material impregnated with ferromagnetic oxide

and provided for instance as a separate insert) and a magnetic material coating that zone (the "Magnetic Zone" concept);

135. The use of a pesticidal composition made up of magnetic material in admixture with (for instance coated with) a pesticide or behaviour modifying chemical (the "Admixture and Coating" concept); and

135. Details such as particle size and 10% strontium ferrite/90% ferrosilicate mix (the "Particle Size and Mixture" concept)."

30. Having rejected Professor Howse's and Dr. Ashby's evidence as to the origin of the concept of using magnetic powder, the only case advanced by the defendants on this part of the case failed. He held that the sole inventors were Mr. Metcalfe and Dr. Lax.

31. On this appeal, Mr. Alexander, Q.C. does not invite me to overturn any of the findings of primary fact made by the Divisional Director. He does not dispute that, on the findings, Mr. Metcalfe and Dr. Lax are entitled to be named as inventors. However, he argues that the Divisional Director has gone too far. He says that it is not possible to conclude that, on the evidence, the sole inventors were Mr. Metcalfe and Dr. Ashby. As I will explain below, Mr. St. Ville protested at this change of position by the defendants and argued that, since his clients only came to meet a case run by the defendants that they were the sole inventors, it was not open to the defendants now to argue for shared entitlement and to accede to that would be unfair to his clients. He says that the evidence and cross-examination was focused on the defendants' case that there was only one invention and its sole originators were Professor Howse and Dr. Ashby.

The Law

32. Section 7 of the Act contains the following material provisions:

"(2) A patent for an invention may be granted -

135. primarily to the inventor or joint inventors.

135. In this Act "inventor" in relation to an invention means the actual devisor of the invention and "joint inventors" shall be construed accordingly.

(4) Except so far as the contrary is established, a person who makes an application for a patent shall be taken to be the person who is entitled under subsection (2) above to be granted a patent and two or more persons who make an application jointly shall be taken to be the persons so entitled."

33. The equivalent provision of the European Patent Convention is Article 60(1) which provides:

"The right to a European patent shall belong to the inventor or his successor in title.

34. The Comptroller's jurisdiction to determine references concerning entitlement are covered by ss.8, 12 and 82 of the Act. Since there is no dispute as to his jurisdiction to determine the issue in this case, I need not refer to them here. In the light of one of the arguments advanced by Mr. Alexander, I should also mention ss.14(3) and (5) of the Act, which provide:

"(3) The specification of an application shall disclose the invention in a manner which is clear enough and complete enough for the invention to be performed by a person skilled in the art.

135. The claim or claims shall:
135. define the matter for which the applicant seeks protection;
(b) be clear and concise;
135. be supported by the description; and
135. relate to one invention or to a group of inventions which are so linked as to form a single inventive concept."

35. According to s.7(3), an inventor is the person who actually devises the invention. In many cases there will be more than one such deviser. One person may shout "eureka" but, depending upon the facts, the inventive concept may be a product of the non-severable contributions of a number of persons. In such a case, they are all inventors. The correct approach to determining this issue is set out, in my view, in *Henry Brothers (Magherafelt) Ltd v. The Ministry of Defence* [1997] RPC 693. At first instance, Jacob J. (as he then was) said:

"Thus, argues Mr. Pumfrey, anyone who contributes to the claim in a substantial way must be regarded as an inventor. Mr. Pumfrey would exclude merely an author of the prior art or an improvement invention on the grounds that he took no part in the actual devising. What is critical, says Mr. Pumfrey, is whether an alleged co-inventor took part in the actual devising to a significant extent.

I do not agree. I do not think it is right to divide up the claim for an invention which consists of a combination of elements and then to seek to identify who contributed which element. I think the inquiry is more fundamental than that. One must seek to identify who in substance made the combination. Who was responsible for the inventive concept named in combination? That was solely Mr. Z. It was his idea which turned a useless collection of elements into something which would work. The patent, as I have said already, is really about the joint; the remainder of the elements of the claim, although necessary, are peripheral." (p 706)

36. The judge rejected the argument of Mr. Pumfrey (as he then was) to the effect that "anyone who contributes" to the invention is an inventor. Instead, he identifies the inventor as the person "responsible for the inventive concept".
37. An appeal to the Court of Appeal ([1999] RPC 442) failed. In his judgment there, Robert Walker L.J. agreed that "it is necessary to identify the inventive concept" (p.448). He also set out what he said was the crucial passage in Jacob J.'s judgment, namely the paragraph beginning with the words "I do not think", set out in the passage cited above. In relation to this, Robert Walker L.J. said this:
- "I cannot entirely agree with the judge's approach in the passage of his judgment (at 706) which I have already set out. I am not inclined to think that the invention was a 'combination' of elements. Mr. Z saw Mr. X's drawing (at a meeting at which Mr. Y was not present) and replaced one type of joint (intended to produce a labyrinthine effect) with another type (a key-joint intended to produce distribution of blast pressure, including rebound pressure). Mr. X's drawing of the joint was not so much useless as directed at a different objective. Nevertheless I feel no doubt that the judge was correct in his conclusion." (p 449)
38. In my view, the only part of Jacob J.'s formulation which Robert Walker L.J. was criticising was his categorisation that the invention there in dispute was a combination. Save in this respect, he appears to have accepted that Jacob J.'s approach was correct.
39. It seems to me that this case sets out the necessary inquiry as follows. First, it is necessary to identify the inventive concept or concepts in the patent or application. Second, it is necessary to identify who came up with the inventive concept or concepts. He or they are the inventors. Third, a person is not an inventor merely because he "contributes to a claim". His contribution must be to the formulation of the inventive concept.
40. These principles are important because I detected an attempt by Mr. Alexander to widen out the pool of inventors to include those who contributed to the enabling disclosure. Thus, his skeleton included the following
- "60. The Divisional Director ought to have asked precisely what was in the person's mind who claimed inventorship, precisely what was disclosed, and precisely what work (including, thinking) was done between that disclosure and the patent and by whom. On the basis of the factual findings made by the Divisional Director, when Mr Metcalfe approached Professor Howse,
135. Mr Metcalfe did not know about the magnetic particle/insect interaction. Professor Howse did. There was no devising or *enabling disclosure* of a method of trapping and/or killing pests, such as insects, comprising using magnetic particles to adhere to the cuticles of the pests by Mr Metcalfe.

(b) Mr Metcalfe did not know whether replacing the powders shown in the insect trap Times article with IDA/PPL powders would work. Professor Howse discovered that they would. There was no *enabling disclosure* (in the sense of a trap which would definitely work) of even the narrow concept of the specific form of trap substituted with magnetic powders of that kind by Mr Metcalfe to Professor Howse. Still less was there a disclosure by Mr Metcalfe of all traps, using magnetic powders which fall within the scope of the claim.

135. There was no *enabling disclosure*, or any disclosure, of a bait station wherein magnetic particles are anchored to a magnetic zone. This was not a concept known to Mr Metcalfe and Mr Metcalfe did not suggest in his evidence that he approached Professor Howse with that concept.” (emphasis added)

41. The reference here to a “bait station” is to the type of device which is not a trap but into which the insect is lured and where it is covered with magnetic powder and noxious chemicals which it then transfers back to other insects.

42. Mr. Alexander’s references to enabling disclosure appear to be based on *Markham Corporation v. Zipner Ltd (No 1)* [2004] RPC 10, 203 –232 a judgment of His Honour Judge Fysh Q.C. (sitting as a judge of the High Court). At paragraph 41, he considered the meaning of the word “devisor” in s.7(3). He said:

“Secondly, the subsection uses the word ‘devisor’ in relation to the inventor, not ‘maker’ or ‘the person who reduced a particular proposal into practice’. The word *devise* has, I consider, a slightly broader signification than ‘make’ or ‘implement’; viz. that of planning a particular course of action before even that course of action is actually implemented. Such usage well accords with the jurisdiction which was intended to encompass an inventor’s work prior even to the making of a patent application. But there must be a limit; an invention cannot be ‘devised’ merely by the statement of an inchoate desideratum or a goal – what Mr Speck characterised in argument as a ‘wish list’. With this in mind, the facts of the particular case will provide the court with material to decide whether an inventor has yet devised an invention.”

43. This appears to be wider than the formulation adopted by Jacob J. in *Henry Brothers*. Fysh H.H.J. then referred to *Collag Corp. v. Merk & Co. Inc* [2003] FSR 216 and, in particular, to the following passage in Pumfrey J.’s judgment in that case:

“Before turning to the facts, I should point out that where there are a number of different contributions to the inventive concept described in a patent application, I do not think it correct to look only at the contributions that are inventive... If the invention is a combination, in which the feature which distinguishes the invention from the prior art is contributed by one person, but all the rest by another, I do not believe it is necessarily correct to say that the latter is, or must be, the sole inventor. It becomes a question of fact. Thus, if one asks Jacob J.’s question in the *Henry Brothers* case at first instance ..., the question is: Who was responsible for the combination? In that case, the inventor was the person

who turned 'a useless collection of elements into something which would work'. On its facts, there was nothing without the contribution of a man found to be the sole inventor."

44. With this in mind, Fysh H.H.J. then said:

"71. By his closing speech, Mr. Watson agreed that if in order to make an invention work further *invention* was required by B, it was plainly equitable to think in terms of co-inventorship and joint ownership. But life is not always that simple: the purveyor of even a non-inventive contribution to a working *combination* may also be a co-inventor. A particular practical difficulty arises when there has been further work by the ex-employee (or his subsequent employer) of a useful but inventive nature or by the application of the common general knowledge, which nevertheless enables the patent application to be made. I have in mind contributions such as the working-out of process parameters, the carrying-out of examples, the making of prototypes, matters of that sort. The quality of this contribution and its impact on the result must I think, depend upon the court's assessment of the facts in each case.

F. What constitutes the 'devising' of an invention? The 'wish list' defence

135. This was one of Mr. Speck's arguments. The antithesis he relied upon is between at the one extreme vague ideas, pipedreams and perhaps a little more specifically, a concrete 'wish list' and, at the other, a working embodiment for a proposal. At what stage can it be said that an invention has in fact been 'devised'? There was no suggestion that a commercial embodiment of an inventive concept *had* to be available before an invention could be said to have been 'devised'; provided it was detailed enough, an invention could be 'devised' entirely on paper or I suppose, in words. Mr. Speck inclined to the view that in the context of a proposal for an apparatus, one had to look for a reduction into practice either on paper or in the form of hardware, a prototype say. Mr. Watson said that it was time wasted speculating as to where a pipedream ended and reality began; each case depended on its facts. If, *a propos* a particular device, a witness with the appropriate technical qualifications was asked: 'Could you make one of these from such and such a description and using common sense and your common general knowledge?' and the answer was, 'Yes, I could', that would be enough; the invention had indeed by then been 'devised'.

135. In my judgment, Mr. Watson is correct in this respect; the matter is to be approached from the point of view of a man skilled in the art, in much the same way as the question of sufficiency. Section 14(3) of the Act requires that:

'the specification of an application be clear enough and complete enough for the invention to be performed by a person skilled in the art'.

At least one way of carrying the antecedent disclosure into effect must I think be ascertainable by the skilled man from the antecedent activity relied upon. I believe that Lord Hoffmann's observation that:

'the concept of an enabling disclosure is central to the law of patents' (*Biogen v Medeva plc* [1997] RPC 1)

is equally true in entitlement proceedings in ascertaining the moment when it can justly be said that an invention has been 'devised'."

45. The outer reaches of this appears to be that those whose contribution to a patent application consists of the supply of data which allows it to meet the requirements of enabling disclosure – for example, by carrying out examples, the making of prototypes, etc. – are devisors of the invention and, therefore, entitled to be named as inventors. If that is what was intended by Fysh H.H.J. – and I am by no means sure that it was – I cannot accept that that is what is meant by s.7; nor is it consistent with the *Henry Brothers* case.
46. In my view, devising an invention and providing enabling disclosure are two quite different things. Although both may be necessary to secure valid protection, as s.14 of the Act shows, they relate to different aspects of the law of patents. It is very possible to make a good invention but to lose one's patent for failure to make an enabling disclosure. The requirement to include an enabling disclosure is concerned with teaching the public how the invention works, not with devising the invention in the first place. Furthermore, with respect, I do not accept that the judge's approach flows from the passage cited from *Collag*. I do not read that as an attempt by Pumfrey J. to resurrect his own, unsuccessful, argument in *Henry Brothers*. On the contrary, it seems to me that Pumfrey J. was saying no more than there may be a number of co-inventors and it is not necessarily correct to only look for the individual who put *all* the bits of inventive jigsaw together. That is not how inventions are made.
47. Frequently an inventive concept arises from a contribution of more than one mind, with each putting some of the pieces together and it is unrealistic to think that only one made it. On the facts, it may be impossible to distinguish between the contributions of a number of individuals to a single inventive concept in which case they are all inventors. It may be, on the facts, that an invention could not have been made without the intellectual input of a number of people. If so, they may all be "responsible for the inventive concept" (to use Jacob J.'s words), even if some of them did not complete the picture. This, however, does not mean – and I do not understand Pumfrey J. to have suggested – that those whose only contribution is to supplying data for enabling disclosure thereby qualify as inventors. In the end, I believe Mr. Alexander backed off from relying on the *Markham* case.
48. Finally on the question of law, it seems to me that there is an issue relating to onus which needs to be considered. Mr. St. Ville accepted that the onus was on his client, as the Divisional Director held. But it is necessary to split the application here into two parts. The first is an application to *add* Mr. Metcalfe and Dr. Lax as inventors; the second is to *remove* Professor Howse and Dr. Ashby. Success on the first does not necessarily lead to success on the second. The differences between these two is reflected in what the claimant needs to prove.

49. Under the first head, all they need to prove is that, on a balance of probabilities, they made a relevant contribution to the inventive concept or one of the inventive concepts in the patent. Under the second, they need to go further. They must overcome the presumption in s.7(4) and prove not only that they devised the inventive concept or concepts but that the named inventors contributed nothing of substance to any of them. This dispute is now one concerned with the latter type of application.

50. The defendants accept that Mr. Metcalfe and Dr. Lax are entitled to be named as inventors of the patent applications but they say that the claimants have been unable to prove that Professor Howse and Dr. Ashby were not co-inventors of the inventive concept or concepts involved. In fact, although not needing to do so, they go further than this and say that it is quite clear that the Professor and Dr. Ashby were responsible for major parts of the inventive concepts in issue.

Is it proved that Professor Howse and Dr. Ashby were not part-devisors of the inventive concepts?

51. I have already mentioned that the defendants argued that there was only one global inventive concept and that the claimants argued that there were four. The Divisional Director rejected both approaches. He concluded that there were two:

"101. Thus, I have identified two inventive concepts: one that I can label as the 'pest/particle' concept and the other that I can label as the 'particle anchoring' concept. More particularly, these inventive concepts respectively are:

135. a method of trapping and/or killing pests, such as insects, comprising using magnetic particles to adhere to the cuticles of the pests; and

(b) an insect trap or bait station wherein magnetic particles are anchored to a magnetic zone "

52. In my view, it is necessary to bear in mind that inventive concepts of this width cover both the idea of using magnetic particles to prevent the insect's feet adhering to a surface (what may be called the 'banana skin' effect) and the idea of sticking magnetic powders to the cuticle of the insect so that it can fly to other insects and pass the magnetic particles impregnated with, say, insecticide on to them (what may be called the 'sticky poison' effect). Although these are comprehended in both inventive concepts identified by the Divisional Director, they are particular easy to identify in the second one. This covers traps and bait stations. Traps involve the use of sloping surfaces or ledges, down or off which the insect slides or falls because of the banana-skin effect. On the other hand, the bait station does not use this effect at all. As explained above, in a bait station, the insect is enticed into an area where its body will pick up the magnetic powder carrying the insecticide and then fly away with it. This is consistent with the following passage in the United Kingdom patent application:

"The pesticide which may be incorporated into the composite particles or incorporated in the composition used in the invention may be specifically

targeted to the control of particular pests. For example, an insecticide may be applied to sexually mature male insects so that it spreads amongst the rest of the population during mating or by contact during swarming. The insecticide is unlikely to spread to other species of insects when transmitted in this way."

53. Mr. Metcalfe's introduction to this field was by way of *The Times* article. As explained above, that describes only the banana-skin effect covered by the Professor's earlier electrostatic patent and incorporated into his cockroach trap. It said nothing about the sticky-poison effect. Mr Metcalfe's suggestion of using magnetic powder in substitution for the electrostatic powder was directed to the banana-skin effect alone. On this point, Mr. Alexander drew my attention to the following passages in Mr. Metcalfe's cross-examination:

"A: The idea was to replace electrostatic powder with magnetic powder. That was my idea.

Q: In the trap shown in the Times article?

A: Yes." (Transcript Day 1 p 105)

and:

"The situation as I read it from the newspaper article was the trap depended upon electrostatic powder being up into place (*sic*) which caused an insect (which is a cockroach) to slide and not to be able to grip and to fall into a sticky pad at the base of the trap. My idea was that electrostatics would prove to be a little bit inconsistent and we could replace the electrostatic powder with magnetic powder. I referred this to the late Mr. Abbott who was an expert, a world-renown expert, on magnetism and magnetic characteristics. He felt this would be quite a good suggestion." (Transcript Day 1 pp 85-86)

54. This is also consistent with what he said in his second witness statement:

"My contribution was a realisation, as I set out in para.9 of my first witness statement, that the retention of talcum powder on a sloped 'bridge of the wooden box' (see 'The Times' article CTM.2 - paragraph 3) by electrostatic means would be unlikely to work in humid conditions most favoured by cockroaches. It does not take an entomologist to realise that."

55. Furthermore, Mr. Metcalfe did not suggest that he was the originator of the idea of sticking the magnetic powder to the insect's cuticle. Mr. Alexander drew my attention to the following passage of Mr. Metcalfe's cross-examination in this respect:

"Q ...you had no idea when you approached Professor Howse that there was any possibility of a magnetic interaction between the powders and the cuticles that would enable this proposal to work?

A: When I spoke to Howse on the telephone I was not aware that the magnetic powder had to stick to the insect because it was not described in the

replacing the electrostatic powder used in Professor Howse's Echobiotic trap with fine magnetic powder."

58. Based on these findings of fact, the Divisional Director concluded:

"Nevertheless, I accept that Professor Howse realised from the outset, whereas in my view Mr. Metcalfe did not, that magnetic powders had to stick to the insects to be effective. I also accept that Professor Howse would have realised, once the suggestion of replacing electrostatic powder with magnetic powder had been made, that it was possible magnetic powder might adhere to the cuticles of insects. Taking account of all these factors, my preliminary view is that Mr. Metcalfe was solely responsible for devising the concept of trapping and/or killing pests by using magnetic particles to adhere to their cuticles and that Professor Howse's contribution was to prove this concept. In reaching this preliminary view I am conscious that it might seem inconsistent with the fact that Mr. Metcalfe was not aware initially that the particles had to adhere to the cuticles of the insects. However, in my view this is not a pre-requisite for devising the pest/particle concept since it is merely a consequence of exposing insects to fine powders, which was supplied by Mr. Metcalfe. Looking at it another way, if Mr. Metcalfe had tested his idea himself and allowed cockroaches to walk through the powders, he could have proved the concept and in the process he would have discovered that the powder stuck to the cuticles of the cockroaches. What is most important in my view is that Mr. Metcalfe thought his idea of using magnetic powders was worth trying; indeed it seems to me that if this was not the case, there would have been no motivation for Mr. Metcalfe to contact Professor Howse in the first place."

59. The trouble with this passage in the decision is that it does not consider the width of the inventive concepts now covered by these patent applications. Furthermore the Divisional Director's speculation⁸ that, had Mr Metcalfe carried out the experiments himself – (they were conducted by Professor Howse) – he would have found out that the magnetic powder would have stuck to the insect's cuticle, is beside the point. Maybe Mr Metcalfe would have found this out, maybe he would not. Maybe, if he had worked it out, he would have realised that it could be applied to achieve the sticky-poison effect; maybe he would not. The fact is he did not do any of these things. They were ideas of Professor Howse and Dr. Ashby; or, more precisely, they were not proved to be ideas and work for which those two were *not* responsible. In other words, on the findings of fact made by the Divisional Director, it was not proved by the claimants that the Professor and Dr. Ashby were not, at least in part, responsible for the inventive concepts in issue.
60. It follows that this appeal should be allowed, insofar as it seeks to reinstate the Professor and Dr. Ashby as inventors, albeit now as co-inventors with Mr. Metcalfe and Dr. Lax.
61. I have no regret in coming to this conclusion. It matches up with what appears to have been the claimants' own belief. Unlike the defendants, prior to the commencement of this litigation, the claimants never asserted they had exclusive rights to these

inventions. Mr. Alexander has referred me to a number of occasions on which the claimants referred to the rights being shared; more than that, the claimants appear to have acknowledged the defendants' inventive contribution.

62. After the essential work had been conducted to show that magnetic powder could be used instead of electrostatic powders in Professor Howse's earlier patent and after the UK patent had been applied for, but before this litigation commenced, Mr. Metcalfe wrote a letter concerning the production, marketing and sale of insect traps which had been conceptually proved by SIL, at the very least, including those the subject of this dispute. In that letter, he set out what he believed was the contribution of various parties to this project. He said:

"(a)Southampton Innovations Ltd - Philip Howse, Roger Ashby - concept inventors, marketing, sales and licensing.

(b) I.D.A. Limited - Colin Metcalfe, Simon Cowie - project management.

I Powder Services Limited - Terry Rowland, Ralph Brown - powder suppliers and licensing."

63. The Divisional Director dealt with this as follows:

"134. Before I reach a final view on this question, there is one further matter I must consider. In his closing statement to me Mr. Alexander urged me to consider the contemporary documents to see what the claimants really thought the position was in relation to inventorship. One of these documents was a letter, dated 20 July 1998, from Mr. Metcalfe to various parties about a proposed project involving the design, production, marketing and sale of a number of pest traps. The letter states that the traps in question are those which have been conceptually proven by SIL. The letter also identifies the parties and their proposed inputs to the project. For example ... [the Divisional Director then sets out the passage which I have set out in the previous paragraph of this judgment]. When cross-examined Mr. Metcalfe clarified that his letter addressed a range of inventions relating to pest traps and that the only interest he had as a concept inventor was in the use of magnetic traps. He also explained that he did not suggest at the time he was a concept inventor of any of the traps in question, because it had been agreed to allow the University to patent the concept relating to magnetic technology. Moreover, he stated that he was concerned to maintain the confidentiality surrounding the use of this technology in insect traps.

135. I do not find Mr. Metcalfe's explanation of this matter wholly convincing. It seems to me that he clearly had the magnetic insect trap concept in mind when he wrote this letter but nevertheless identified the role of 'Southampton Innovations Ltd - Philip Howse, Roger Ashby' as 'concept inventors' and the role of 'IDA Limited - Colin Metcalfe, Simon Cowie' simply as 'project management'. Moreover, as Mr. Alexander rightly pointed out during his cross-examination of Mr. Metcalfe, any agreement on who would patent the relevant technology seems to be a separate issue to the question of who devised the concept protected by the patent. Thus, I have some sympathy for the

proposition, presented by Mr. Alexander, that Mr. Metcalfe regarded Professor Howse and Dr. Ashby as the concept inventors in July 1998. However, I must also accept that the proposed project related to a number of pest traps in addition to any reliant on the magnetic technology and it is plausible that, as Mr. Metcalfe suggested, he took a broad view when he wrote this letter."

64. I am not sure whether this really addresses the contents of the letter. In any event, I think the letter is at least consistent with a number of other documents authored by, or confirmed by, the claimants to the effect that they did not challenge the defendants' entitlement to a share in these inventions, something which the Divisional Director's decision would deny them.
65. This leaves only the matter of Mr. St. Ville's objection that it would not be fair to his clients to deprive them of total victory now, when the defendants had run an all-or-nothing defence to the claim.
66. I have some sympathy for this submission; after all, it was not the claimants who set their face against the sharing of the proceeds of this work and it was not their major witnesses who were disbelieved by the Divisional Director. But sympathy may sound in costs. I am concerned where the rights in these inventive concepts lie. As to that, there are four factors which, in my view, undermine Mr. St. Ville's objection.
67. First, his clients' case always expressly contained an assertion that they were part owners of these inventions. It is no hardship that that assertion rather than the more extreme one is proved correct.
68. Second, although the defendants asserted a single global inventive concept, the claimants did not. They invited the Divisional Director to consider that there was more than one. Furthermore, whether they had or not, the Divisional Director and this court are obliged to determine what the inventive concepts are and their scope.
69. Third, as mentioned above, the onus is on the claimants to prove that Professor Howse and Dr. Ashby are not entitled to continue to be named as inventors. Unlike proving that Mr. Metcalfe and Dr. Lax are inventors, this involves proving a negative. That imposes on them the task of proving that all parts of the inventive concepts in issue came from someone other than those currently identified as inventors. The defendants are entitled to demand that the claimants prove this case. If the claimants fail to discharge the onus on them to prove that all parts of the inventive concepts came from people *other* than the Professor and Dr. Ashby, it is not the defendants' fault.
70. Finally, whatever may be the scope of the pleadings, the fact is that the evidence filed and the cross-examination covered a wide field, including who was, or was not, responsible for the various pieces of technology to be found in the applications in suit.

That being so, it is not right that the court should close its eyes to the realities of inventorship so disclosed.

71. For these reasons, I will allow the appeal to the limited extent indicated above.

Unveiled: cockroach trap to beat the world

By DAMIAN WHITWORTH

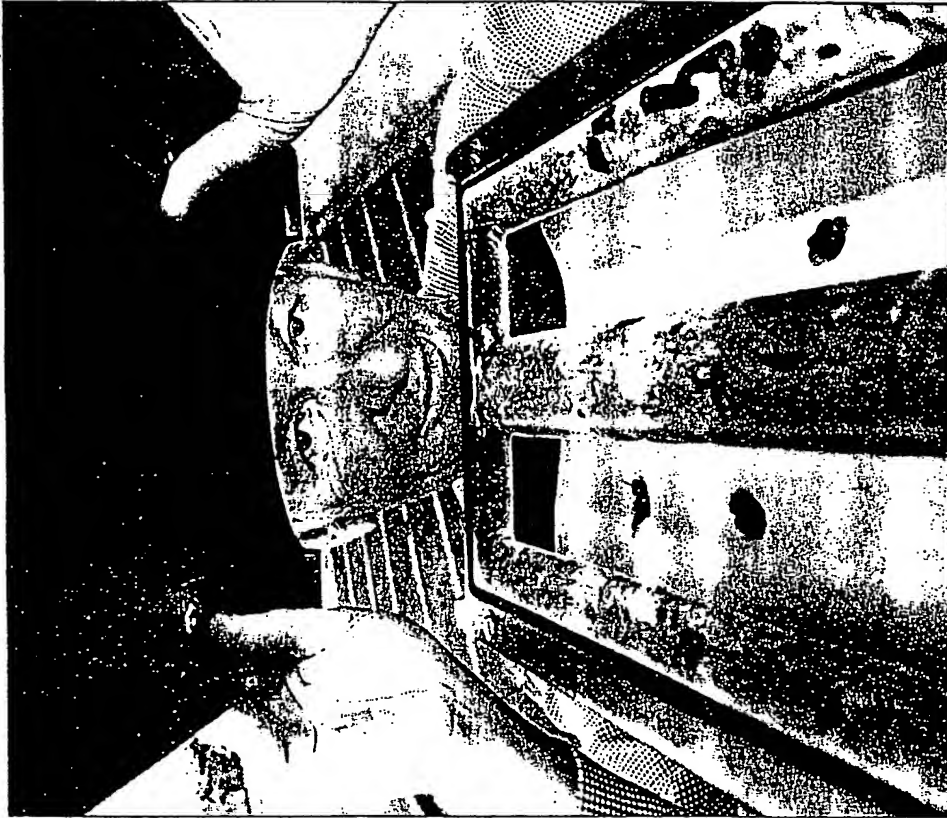
THE first 200 innovations chosen to represent British flair to the world will be revealed by Tony Blair tonight. The products and services, which must have been launched since January 1995 and created in Britain, were chosen by a panel of 50 designers, industrialists, scientists and academics.

The items designated "Millennium products" were among those submitted by more than 1,000 companies in response to the Prime Minister's call last year to show that Britain was leading the "creative revolution". A total of 2,000 will be chosen over the next two years.

The first selection ranges from the latest models off the production lines of giant corporations to the creations of backroom inventors. Among the more intriguing items is the Eco Binic Cockroach Trap, created by scientists at Southampton University. They tested it in a London flat, where it terminated 50,000 roaches.

The creatures are lured onto the bridge of the wooden box by a bait. When their feet alight on the electrostatic talcum powder with which it is dusted, they slip onto a flypaper and meet their end. The absence of pesticides is cited as an advantage over more traditional forms of extermination and a \$1 mil-

ROY RILEY



Philip Howse demonstrating his cockroach trap, using talcum powder

lion deal has been clinched with an American manufacturer.

The 200 products will be able to sport the Millennium Products marque and will be displayed at international trade fairs and promoted by the Design Council. Some will be exhibited in the

Dome.

Among them are Ford's Ka motor car and the Lotus Elise, James Dyson's bagless vacuum cleaner, the new London taxis and Eurostar trains. Lame cows are to benefit from Cowslips, a form of orthopaedic shoe. Another company is produc-

ing gloves for Nasa from a textile that conducts electricity.

Some products will not appear in the Dome. They include the British-designed Lantau Link, a six-lane covered railway bridge joining Hong Kong Island to the new airport.

Experts who will rebrand Britain

ROBIN COOK, the Foreign Secretary, has named the 33 experts whose task it is to transform Britain's image around the world.

The "Panel 2000", which is chaired by Derek Fatchett, the Foreign Office Minister, has been drawn from the public and private sectors.

Key figures include Sir Colin Marshall, the chairman of British Airways and Incheape, deputy chairman of British Telecom and president of the Confederation of British Industry.

Stella McCartney, 26, the chief designer of the French fashion house Chloé, the Channel 4 presenter Zeinab Badawi and the Minister without Portfolio, Peter Mandelson, will join the athena Judy Simpson and the MP for Taiton, Martin Bell, on the panel.

Mr Cook said: "We do not reject our heritage — we value our heritage. But we also need to be a forward-looking country prepared to face the challenges of the new millennium."

He said it was "important that we all project a positive image of our work and of the modern Britain abroad".

Mr Cook added: "We want to build in Britain a self-confident society, outward-looking and proud of its place as a leading partner in Europe and a pivotal nation in the world. We are creating an open, dynamic economy."

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